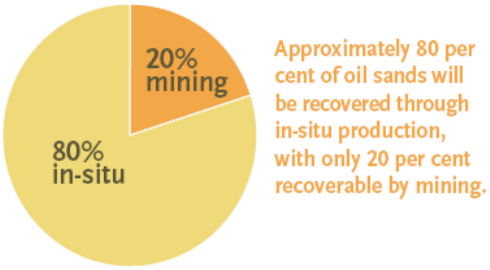
CANADA: The Future of the Alberta Oil Sands Steam-Assisted Gravity Drainage

Crystal Roberts
Michael Goodwin
April 2010

Summary

New developments in the oil and gas industry are creating exciting opportunities for U.S. businesses in the Alberta oil sands. New techniques have been developed to recover bitumen from wells that are too deep for conventional mining practices. Alberta's oil sands are estimated to have 20 percent of reserves accessible through open-pit mining; the remaining will have to be extracted via in situ methods. One productive in situ method currently implemented in many oil sands projects is called Steam-Assisted Gravity Drainage (SAGD).



Other methods for removing bitumen from reservoirs too deep for conventional means were tested; however, few of them had any real success until Roger Butler invented SAGD in 1978. SAGD is currently the only economically viable means of removing bitumen from mining leases that are too deep for conventional mining. Even today, some similar techniques to SAGD only extract approximately 20 percent of the in situ bitumen, whereas SAGD can remove close to 50 percent.

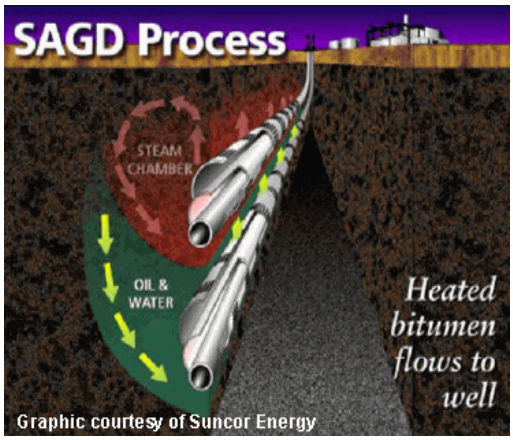


Image retrieved from:
http://www.regentenergygroup.com/images/sagd.gif

SAGD is a process that uses steam to heat the bitumen until it is able to flow via gravity into a return pipe. It is then pumped to refineries and end users. It is estimated that in situ extraction of bitumen will make up the vast majority of new projects in the Alberta oil sands. This will make in situ methods, like SAGD, essential in the future development of the Alberta oil sands.

Benefits of SAGD

SAGD has become the primary focus for in situ extraction in the Alberta oil sands primarily because it is reliable, effective and most importantly, profitable. SAGD offers ecological benefits over traditional mining methods and cost reduction due to operating efficiencies. Ecologically, SAGD does less damage to the environment and surrounding areas than open pit mining. SAGD developers have also reduced the amount of water and natural gas used to produce steam, reducing both input costs and emissions. Some companies with expertise in SAGD have developed their own efficient methods of reducing operating costs related to water and natural gas.

SAGD also has opportunity to grow and advance as new technology increases efficiencies. SAGD can be combined with other technologies, both currently available and in development, to extract more oil in situ while at the same time reducing emissions and pollution.

Future of SAGD

The SAGD process can only remove approximately 50 percent of the bitumen in situ meaning that the remaining 50 percent is unrecoverable with conventional techniques. New SAGD combination methods are being developed to increase in situ production. One prominent development has been in combining SAGD with a solvent that is injected with the steam. The goal of injecting the solvent is to increase the viscosity of the oil, thus allowing more oil to be recovered. This method is called Expanding Solvent Steam Assisted Gravity Drainage (ES-SAGD) and has potential to make SAGD the premiere in situ method for years to come. Field tests of this new variation of SAGD are already underway in Alberta. Other SAGD technologies under development are:

- Tapered Stream Solvent SAGD - (TSS-SAGD)
- Cyclic Steam Injection – (CSS-SAGD)
- Low Pressure SAGD - (LP-SAGD)

These techniques use some variant of steam, pressure or solvents to allow for more oil to be extracted at each well. All of these new techniques promise to increase production and maintain the competitiveness of the SAGD process.

Best Prospects

U.S. organizations that have products or services related to pumping, steam production, drainage, or any new technology that can reduce water and natural gas usage in the production of steam have vast opportunities to enter into the SAGD technology market. The development of SAGD will push the oil and gas industry forward for the foreseeable future. Companies that can provide or improve the efficiency and production capacities of SAGD wells will have a bright future in the Alberta oil sands.
Key areas of innovation and development in SAGD technology are in the reduction of greenhouse gases, reducing environmental footprints and reducing natural gas and water inputs. Continuous improvements for in situ technology include:

- Alternative Energies for production
- Solvent-assisted recovery
- Reliable down hole pumps
- Multi-phase flow measurement
- Water reuse
- Steam chamber growth tracking
- Drilling technology
- Pipeline transportation
- Gas-over-bitumen reserves
- Shallower/more marginal resources
- Reducing the high energy demand for thermal recovery
- Reduction of natural gas and other energy sources used to produce steam
- More reliable down hole pumps
- Development of better multi-phase flow measuring devices for water, oil and gas production mixtures
- Better water reuse and recycle technology
- Improved reservoir simulations and training
- Steam chamber tracking technology
- Horizontal drilling technology improvements

Conclusion

SAGD technology is a strong focus across the Alberta oil and gas industry. New developments will continue to push SAGD technology forward to make it the premiere technology in the oil and gas sector. Companies that can improve any aspect of SAGD production technologies will have business opportunity within the Alberta oil sands.

Upcoming trade events

Go-Expo
June 7 – 9, 2011
Stampede Park, Calgary, AB

Global Petroleum Show
June 8 – 10, 2010
Stampede Park, Calgary, AB

Oil Sands Trade Show & Conference
September 14 - 15, 2010
McDonald Island, Fort McMurray, AB

Oil Sands Trade Show & Conference
September 21 – 22, 2010
Northlands, Edmonton, AB

Industry Contacts

Canadian Association of Petroleum Producers (CAPP)

Energy Resources Conservation Board (ERCB)

National Energy Board Canada

Canadian Association of Drilling Engineers (CADE)

Canadian Association of Oil Well Drilling Contractors (CAODC)

Petroleum Services Association of Canada (PSAC)

Canadian Energy Research Institute (CERI)

Sources

ConocoPhillips
conocophillips.com/EN/tech/upstream/challenged/Pages/index.aspx

Industry Canada. Oil Sands Technology Roadmap
ic.gc.ca/eic/site/trm-crt.nsf/eng/rm00217.html#p4.2

Mining Technology.com
mining-technology.com/projects/athabascasands/

National Energy Board Report. Canada's Oil Sands: Opportunities and Challenges to 2015
neb.gc.ca/clf-nsi/rnrgynfmtn/nrgyrprt/lsnd/pprtntsndchllngs20152004/pprtntsndchllngs20152004-eng.pdf

Oil Sands Discovery Fact Sheet
oilsandsdiscovery.com/oil_sands_story/pdfs/insitu.pdf

Regent Energy Group. SAGD PROCESS.jpg
www.regentenergygroup.com/images/sagd.gif

Total Canada
total-ep-canada.com/about/pdfs/whatis-excerpt.pdf

University of Alberta: SAGD information
uofaweb.ualberta.ca/ccg/pdfs/Vol3-IntroSAGD.pdf

More Information

For more information, please contact Commercial Specialist Crystal Roberts at the U.S. Commercial Service in Calgary, Canada:
Email: crystal.roberts@mail.doc.gov
Phone: 1 (403) 265-2116
Fax: 1 (403) 266-4743
Website: www.buyusa.gov/canada

The U.S. Commercial Service – Your Global Business Partner

With its network of offices across the United States and in more than 80 countries, the U.S. Commercial Service of the U.S. Department of Commerce utilizes its global presence and international marketing expertise to help U.S. companies sell their products and services worldwide. Locate the U.S. Commercial Service trade specialist in the U.S. nearest you by visiting www.export.gov/eac.

Comments and Suggestions: We welcome your comments and suggestions regarding this market research. You can e-mail us your comments/suggestions to: **Customer.Care@mail.doc.gov**. Please include the name of the applicable market research in your e-mail. We greatly appreciate your feedback.